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NOTE ON THE GEOTROPISM OF PARAMECIUM.

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Harper's¹ criticism of my experiment demonstrating, as it seemed to me, that the anterior end of paramecium is the heavier and consequently that the negative geotropism of this animal is an active process was founded upon the assumption that when one begins to centrifuge the animals their geotropism is reversed and becomes positive. Thus the animals start, according to Harper, to move in the direction of the accelerating force and consequently away from the axis of the centrifuge. Harper's experiment by no means proves his contention and it always seemed to me, as Kanda brings out in the foregoing paper, that the quickness with which a high centrifugal force is developed in the centrifuge would prevent the animals from orienting themselves before they were thrown into the capillary tube where turning is impossible. However, this suggestion might not seem proof to some people; and I have, therefore, performed the following experiment:

A culture of paramecium was cooled almost to 0° C. At this temperature they move very sluggishly and show no distinct orientation to gravity. They gather at the bottom of a test tube due, I am sure to the fact that their specific gravity is greater than water and that they make no movement sufficient to keep themselves suspended. The centrifuge was prepared with capillaries such as Kanda and I have used but each one immersed in a larger tube containing ice. A drop of the cold paramecium culture was quickly transferred to the cold capillary tube and centrifuged. The animals were always precipitated with their anterior ends away from the axis. I am quite certain that the animals at this temperature make no reaction to gravity or agitation and that the proof may be considered definite that the head end of the animal is the heavier and that the ordinary geotropic orientation is an active process.

¹ For the literature see the preceding article by Kanda.